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1991 Annual AMS-MAA Survey

(First Report)

Report on the 1991 Survey of New Doctorates
Donald E. McClure
Salary Survey for New Doctorates
Faculty Salary Survey

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1991 Annual AMS-MAA Survey

(*First Report*)

Report on the 1991 Survey of New Doctorates, *Donald E. McClure*
Salary Survey for New Doctorates
Faculty Salary Survey
Doctoral Degrees Conferred, 1990-1991

This first report on the 1991 Survey includes a report on the 1991 survey of new doctorates, a report on salaries of new doctorates, salary data on faculty members in four-year colleges and universities, and a list of names and thesis titles for members of the 1990–1991 Ph.D. class. The report is based on information collected from questionnaires distributed in May to departments in the mathematical sciences in colleges and universities in the United States and Canada, and later to the recipients of doctoral degrees granted by these departments between July 1990 and June 1991, inclusive. A further questionnaire was distributed in September, concerned with data on fall enrollments, majors, and departmental size. These data will appear in the second report on the 1991 Survey, in a spring 1992 issue of *Notices*.

The 1991 Annual AMS-MAA Survey represents the thirty-fifth in an annual series begun in 1957 by the Society. The 1991 Survey is under the direction of the AMS-MAA Data Committee whose members are Edward A. Connors, Lincoln K. Durst (consultant), John D. Fulton, James F. Hurley, Charlotte Lin, Don O. Loftsgaarden, David J. Lutzer, James W. Maxwell (ex officio), Donald E. McClure (chair), and Donald C. Rung. Comments or suggestions regarding this Survey may be directed to the committee.

For these reports, departments are divided into groups according to the highest degree offered in the mathematical sciences:

Groups I and II include the leading departments of mathematics in the U.S. according to the 1982 assessment of Research-Doctorate Programs conducted by the Conference Board of Associated Research Councils in which departments were rated according to the quality of their graduate faculty.[1]
Group I is composed of 39 departments with scores in the 3.0–5.0 range.
Group II is composed of 43 departments with scores in the 2.0–2.9 range.
Group III contains the remaining U.S. departments reporting a doctoral program.
Group IV contains U.S. departments (or programs) of statistics, biostatistics and biometrics reporting a doctoral program.
Group V contains U.S. departments (or programs) in applied mathematics/applied science, operations research and management science which report a doctoral program.
Group Va is applied mathematics/applied science; **Group Vb** is operations research and management science.
Group VI contains doctorate-granting departments (or programs) in the mathematical sciences in Canadian universities.
Group M contains U.S. departments granting a master's degree as the highest graduate degree.
Group B contains U.S. departments granting a baccalaureate degree only.

[1]These findings were published in *An Assessment of Research-Doctorate Programs in the United States: Mathematical and Physical Sciences*, edited by Lyle V. Jones, Gardner Lindzey, and Porter E. Coggeshall, National Academy Press, Washington, D.C., 1982. The information on mathematics, statistics and computer science was presented in digest form in the April 1983 issue of *Notices*, pages 257-267, and an analysis of the above classifications was given in the June 1983 *Notices*, pages 392-393. For a listing of departments in Groups I and II see April 1988 *Notices*, pages 532-533.

Highlights

- U.S. institutions awarded 1074 doctorates in the mathematical sciences from July 1, 1990 to June 30, 1991, an increase of 15 percent over last year's fall count and 26 percent more than the average of the fall counts for the last four years.

- The number of U.S. citizens reported to have received doctorates in the mathematical sciences is 461, which is 15 percent higher than the number earning doctorates last year and 27 percent higher than the record lows recorded in 1986–87 and 1987–88.

- The number of non-U.S. citizens receiving doctorates in the mathematical sciences reached a new high of 600, well over twice the number of noncitizens earning doctorates in the U.S. ten years ago.

- Of the 461 U.S. citizen doctorates 10 are black. In 1989–90 only 4 of the U.S. citizen doctorates were black.

- Total employment of new doctorates in the U.S. increased from last year, but employment in some sectors decreased and the percentage of unemployed increased substantially. As of late September 1991, approximately 12 percent of the new doctorates were reported to be still seeking employment. The percentage unemployed is over twice the corresponding percentage reported last fall.

- The total number and the percentage of women among U.S. citizen new doctorates reached new highs in 1990–91. A total of 112 U.S. citizen women earned doctorates from U.S. universities, accounting for 24 percent of the doctorates awarded to U.S. citizens.

- The median starting salary of new doctorates reporting teaching (or teaching and research) was $33,000 for men and $33,200 for women.

- In almost all cases, the mean salary by faculty rank reported for 1991–92 increased less than five percent over that reported for 1990–91. Major exceptions were the 1991–92 mean salaries reported for associate and full professors in doctorate-granting departments of applied mathematics and operations research (Group V), which increased 9% and 7% respectively.

Report on the 1991 Survey of New Doctorates

Donald E. McClure

This report presents a statistical profile of new doctorates in the mathematical sciences awarded by universities in the United States and Canada during the period July 1, 1990 through June 30, 1991. It includes the employment status of recipients of 1990–91 doctorates in the mathematical sciences (as of September 20), an analysis of the data by sex, racial/ethnic group and citizenship, and reports trends in the number of doctoral degrees for each of Groups I through V (see box on preceding page for description of groups). Table 1 provides the response rates for the 1991 Survey of New Doctorates.

TABLE 1: Response Rates

Group I	39 of 39
Group II	42 of 43 including 3 with 0 degrees
Group III	80 of 86 including 27 with 0 degrees
Group IV	53 of 75 including 5 with 0 degrees
Group Va	12 of 16
Group Vb	18 of 33
Group VI	27 of 31 including 8 with 0 degrees

Doctorates Granted

The number of new doctorates reported in 1990–91 by U.S. and Canadian mathematical sciences departments is 1142. Table 2A gives the fall counts for the past five Annual Surveys. This year's fall count will be updated in the Second Report of the 1991 Survey, to appear in a spring 1992 issue of *Notices*. Table 2B reports for comparison the fall and spring counts in the years 1986–87 through 1989–90.

The total number of new doctorates increased substantially this year. The total count has been increasing steadily since 1984–85. This year's increase is the largest in absolute numbers (151) and in percentage (+15 percent) during this six-year period. Cumulatively, the total number of new doctorates has increased 49 percent since 1984–85.

Table 2A: New Doctorates, Fall Counts

	86–87	87–88	88–89	89–90	90–91
U.S.	779	804	905	933	1074
Canada	66	52	53	58	68
Total	845	856	958	991	1142

Table 2B: New Doctorates, Fall and Spring Counts

	86–87		87–88		88–89		89–90		90–91	
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
U.S.	779	808	804	828	905	919	933	950	1074	*
Canada	66	66	52	55	53	62	58	59	68	*
Total	845	874	856	883	958	981	991	1009	1142	*

* To appear in a spring 1992 issue of *Notices*.

Table 2C records the number of new doctorates in the mathematical sciences in the U.S. from the years 1986–87, exclusive of Group Vb. The response rate for Group Vb, which includes departments in engineering and management science, is the lowest of all groups.

Groups I and II account for the largest part of the increase shown in Table 2C. The count for Group I increased by 72 (20 percent) and the count for Group II increased by 46 (33 percent) over the corresponding fall counts in the 1990 Annual Survey. There was virtually no change in the fall counts for Group III. The fall count for Group IV (statistics) showed a modest decrease, though that finding must be interpreted cautiously in view of the lower response rate for Group IV.

Table 2C: New Doctorates Awarded by Groups I–Va

	86–87	87–88	88–89	89–90	90–91
I-Va	743	760	854	881	990**

** This is a fall count. The other entries in Table 2C are spring counts. Table 2C will be updated to include a spring count for 1990–91 in a spring 1992 issue of *Notices*.

Employment Status of New Doctorates, 1990–1991

In 1990, the Annual Survey started adding new questions to monitor the changing employment market. At the time, the AMS-MAA Data Committee was interested in collecting baseline data against which the future shortages of Ph.D.s projected in the science press could be compared. In the past two years, however, changing economic conditions and other perturbations of the employment market have refocused the interest of the mathematics community on a difficult job market. In this report, we shall present a broader analysis than is customary to illuminate patterns of employment for new doctorates.

Table 3A shows the employment status, by type of employer and field of degree, of the 1142 recipients of doctoral degrees conferred by the mathematical sciences departments in the U.S. and Canada between July 1, 1990, and June 30, 1991. The names of these individuals are listed with their thesis titles in a later section of this First Report of the 1991 Annual Survey. Again this year we present the employment status of the 227 women new doctorates in Table 3B. The employment information was obtained initially from the departments granting the degrees and subsequently from data provided by the degree recipients themselves.

The first five rows of Table 3A give the numbers of new doctorates who have accepted appointments in U.S. doctorate-granting mathematical sciences departments (Groups I–V). The next two rows give the numbers who have accepted appointments in mathematical sciences departments granting masters and bachelors as the highest degrees.

Table 3A: Employment Status of 1990–1991 New Doctorates in the Mathematical Sciences

Type of Employer	Algebra or Number Theory	Real or Complex Analysis	Geometry or Topology	Logic	Probability or Statistics	Applied Mathematics	Discrete Math or Combinatorics	Numerical Analysis	Linear or Nonlinear Optimization	Other	TOTAL
Group I	21	18	31	3	5	14	1	2	1	4	100
Group II	5	8	5		2	10	1	4	1	1	37
Group III	9	8	11		9	9	4	1	1	2	54
Group IV					37	2					39
Group V					5	7	1	2	1	1	17
Masters	18	12	7		15	9	7	3	2	6	79
Bachelors	17	17	27	2	14	18	6	5	1	18	125
Two-year Colleges	4	2	1		1	7				3	18
Other Academic Departments	3	1	1	3	17	14	2	2	2	17	62
Research Institutes	5	3	4		9	4			1	7	33
Government		2			7	10	2	1		2	24
Business and Industry	5	3	6	2	55	10	4	4	13	14	116
Canada, Academic	11	3	8		6	11	4	1	1	8	53
Canada, Nonacademic											
Foreign, Academic	14	20	10	3	28	11	1	2	4	11	104
Foreign, Nonacademic		1			4	1	1			3	10
Not seeking employment		1	1		4		1	3		3	13
Not yet employed	14	17	17	3	25	23	11	4	1	10	125
Unknown (U.S.)	3	4	2		4	8		2	2	7	32
Unknown (non-U.S.)*	19	16	21	4	14	11	4	4	3	5	101
Total	148	136	152	20	261	179	50	40	34	122	1142

*Non-U.S. citizens who returned to their country of citizenship and whose status is reported as "unknown" or "still seeking employment".

Table 3B: Employment Status of 1990–1991 New Doctorates in the Mathematical Sciences Females Only

Type of Employer	Algebra or Number Theory	Real or Complex Analysis	Geometry or Topology	Logic	Probability or Statistics	Applied Mathematics	Discrete Math or Combinatorics	Numerical Analysis	Linear or Nonlinear Optimization	Other	TOTAL
Group I	3	4	3	1	1	2				1	15
Group II		3	1		1	2		1	1		9
Group III	2		1		2	3					8
Group IV					9						9
Group V					3						3
Masters	6	1	1		4	1	2				15
Bachelors	8	5	12		3	3	1	2		3	37
Two-year Colleges	1					2					3
Other Academic Departments	1	1			5	2	1	1	1	6	18
Research Institutes					2					3	5
Government					2		1			1	4
Business and Industry		1			16	3		1	3	2	26
Canada, Academic					1		1		1	1	4
Canada, Nonacademic											
Foreign, Academic	2	3		1	9	2		1		3	21
Foreign, Nonacademic											
Not seeking employment					1			1			2
Not yet employed	2		4	1	7	6	2				22
Unknown (U.S.)					1					3	4
Unknown (non-U.S.)*	3	3	6	1	3	3	1			2	22
Total	28	21	28	4	70	29	9	7	6	25	227

*Non-U.S. citizens who returned to their country of citizenship and whose status is reported as "unknown" or "still seeking employment".

Most new doctorates accept academic positions. Of the 704 new doctorates employed in the U.S., a total of 564 (80 percent) hold jobs in academia. For comparison, last year's First Report showed 678 new doctorates employed in the U.S., including 571 in academic positions. The 564 academic positions this year include a total of 247 in U.S. doctorate-granting departments (Groups I–V). This number is only slightly smaller than last year (259 positions in Groups I–V) and remains above the corresponding numbers in the previous two years (240 in 1988–89 and 207 in 1987–88). Among these Groups, the number hired by Group I has been essentially constant for three years. The numbers hired by Group II and Group III both declined by nine (-20 percent and -14 percent, respectively). The number of new doctorates employed by bachelor's degree-granting colleges and universities increased by 20 (19 percent) from 1989–90.

Excluding those whose employment status is unknown, 22 percent of the women and 25 percent of the men accepted appointments in Groups I–V departments.

The number of new doctorates taking jobs in U.S. nonacademic positions increased significantly this year. The 140 positions in government, business and industry in the U.S. account for 20 percent of total U.S. employment. Last year at this time, the total of 107 U.S. nonacademic positions represented 16 percent of the U.S. total.

A striking change has occurred in the numbers shown as "not yet employed" in Tables 3A and 3B. Of those whose employment status is known, over 12 percent are unemployed. At the same time last year, 5.7 percent of the 1989–90 new doctorates were reported as "not yet employed". The data in Table 3A were obtained in many instances early in the summer of 1991 and do not reflect subsequent hiring. Nonetheless, the year-to-year comparision shows compelling evidence of the difficult job market faced by this year's new doctorates. An update of Table 3A is planned for the Second Report in a spring 1992 issue of *Notices*. In a similar update last year, the percentage of 1989–90 new doctorates who had reported not finding employment was two percent (see *Notices*, November 1990, page 1219, and May/June 1991, page 413).

The 1991 Survey sent to individual new doctorates asked for information about the type of academic position held. Based on an early response from 377 individuals who provided information about their contract terms, 50 percent reported that their position is not tenure-eligible and 50 percent reported that their position is tenured or tenure-eligible. The respondents include holders of academic positions everywhere, not exclusively within the U.S.

Table 3C shows employment status, by type of employer and Group of the department granting the degree, of the 1142 new doctorates. The results document patterns generally recognized anecdotally. For example, Table 3C shows that 85 percent of the new doctorates obtaining academic positions in Group I departments obtained their degree from a Group I department. Similarly, 85 percent of the new doctorates taking a position in a Group IV department obtained their degree from a Group IV department. New doctorates from a Group IV or a

TABLE 3C: Employment Status of 1990–1991 New Doctorates by type of granting department

TYPE OF EMPLOYER	TYPE OF DOCTORATE-GRANTING DEPARTMENT						TOTAL EMPLOYED BY TYPE OF EMPLOYER
	Group I Math	Group II Math	Group III Math	Group IV Statistics	Group V Applied Math/OR	Group VI Canada	
Group I	85	7	1	2	3	2	100
Group II	18	9	3	1	6		37
Group III	29	8	10	6	1		54
Group IV		2	3	33	1		39
Group V	1	2	1		13		17
Masters	24	22	16	12	5		79
Bachelors	39	37	38	4	7		125
Two-year Colleges	3	4	9	1	1		18
Other Academic Departments	20	5	3	14	20		62
Research Institutes	14	2	1	9	6	1	33
Government	5	3	3	4	8	1	24
Business and Industry	15	15	11	39	36		116
Canada, Academic	16	4	2	2		29	53
Canada, Nonacademic							
Foreign, Academic	47	16	6	21	7	7	104
Foreign, Nonacademic	2	2		3	3		10
Not seeking employment	3	6	1	3			13
Not yet employed	39	30	19	10	11	16	125
Unknown (U.S.)	10	3	3		16		32
Unknown (non-U.S.)*	56	8	6	6	13	12	101
TOTALS	426	185	136	170	157	68	1142

*Non-U.S. citizens who returned to their country of citizenship and whose status is reported as "unknown" or "still seeking employment".

Group V department assume U.S. nonacademic positions in greater proportion than new doctorates from Groups I–V overall. The unemployment rates are different for each group. Excluding those whose employment status is unknown, the percentages who are reported to be still seeking employment are 10.8 percent for Group I, 17.2 percent for Group II, 15.0 percent for Group III, 6.0 percent from Group IV, 8.6 percent for Group V and 28.6 percent for Group VI (Canadian departments).

Table 3D shows the pattern of employment within broad job categories broken down by citizenship status for those new doctorates earned from U.S. universities (Groups I–V). The citizenship status is known for 1029 of 1074 recipients of doctorates from U.S. institutions. The rate of unemployment is slightly higher for non-U.S. citizens (12.2 percent of those whose job status is known) than it is for U.S. citizens (10.4 percent). Understandably, a much higher percentage of the noncitizens are found in foreign academic positions. The percentage of U.S. citizens in U.S. nonacademic jobs is much higher than the percentage of noncitizens in the same category (18.2 percent of citizens versus 11.3 percent of noncitizens whose job status is known). U.S. citizens hold positions in U.S. academic doctorate-granting departments in lower proportion than do noncitizens (22.7 percent of citizens compared to 28.4 percent of noncitizens), while citizens hold positions in non doctorate-granting U.S. departments in substantially higher proportion than do noncitizens (41.0 percent of citizens compared to 20.6 percent of noncitizens); here all percentages exclude new doctorates whose job status is unknown.

TABLE 3D: Employment Status of 1990–1991 U. S. New Doctorates (Groups I–V) by citizenship status*

TYPE OF EMPLOYER	TYPE OF CITIZENSHIP				TOTAL DOCTORATES WHOSE CITIZENSHIP IS KNOWN*	
	U.S. Citizens		Non-U.S. Citizens			
	Number	Percent	Number	Percent	Number	Percent
U.S. Academic, Ph.D. Department	96	21	149	26	245	24
U.S. Academic, non-Ph.D. Department	173	38	108	19	281	27
U.S. Research Institute	16	4	16	3	32	3
U.S. Nonacademic	77	17	59	10	136	13
Foreign Academic	12	3	109	19	121	12
Foreign Nonacademic			10	2	10	1
Not seeking employment	4	1	9	2	13	1
Unemployed and seeking employment	44	10	64	11	108	10
Unknown status (U.S. address)	28	6	4	1	32	3
Unknown status (foreign address)			51	9	51	5
TOTALS	450	100%	579	100%**	1029	100%**

* The adjusted total varies from that on Table 5 because the data are gathered on different surveys.
** Column percents are rounded to the nearest whole percent.

Acknowledgments

The Annual AMS-MAA Survey attempts to provide an accurate appraisal and analysis of various aspects of the academic mathematical scene for the use and benefit of the mathematics community. Every year, college and university departments in the United States and doctorate-granting departments in Canada are invited to respond. The Annual Survey relies heavily for the quality of its information on the conscientious efforts of the dedicated staff members of these departments. On behalf of the AMS-MAA Data Committee and the Annual Survey staff, I thank the many secretarial and administrative staff members in the mathematical sciences departments for their cooperation and assistance in responding to the survey questionnaires.

Several people have made essential contributions to the preparation of the reports on the 1991 Annual AMS-MAA Survey. I express special thanks to Monica Foulkes for her constant support and initiatives on all aspects of the Annual Survey. Jim Maxwell regularly offers insight and direction for the work of the Data Committee. Monica and Jim share credit for the companion articles on starting salaries of new doctorates and on faculty salaries. Don Loftsgaarden and Ed Connors contributed to the data analysis and bibliography.

Table 3E and the accompanying chart show how employment patterns have varied over time for the major categories of employment of new doctorates. See also Table 5 and the graph accompanying it for the corresponding longitudinal pattern of doctorate production by U.S. universities. (Table 3E includes doctorates granted by Canadian universities and Table 5 does not.) Note that all years prior to 1982–83 include doctorates granted by computer science departments.

Table 3E: Employment of New Doctorates in the Mathematical Sciences, 1977–78 to 1990–91

TYPE OF EMPLOYMENT	1977–1978	1978–1979	1979–1980	1980–1981	1981–1982	1982–1983	1983–1984	1984–1985	1985–1986	1986–1987	1987–1988	1988–1989	1989–1990	1990–1991*
U.S. academic	524	508	489	509	497	454	470	435	441	456	478	554	595	564
U.S. nonacademic	210	202	204	197	170	129	134	122	136	123	110	119	122	140
Canadian	62	47	44	41	36	30	27	30	29	37	46	37	53	53
Foreign	120	98	93	131	115	141	126	157	156	164	177	177	137	114
Total known employed	916	855	830	878	818	754	754	744	762	780	811	887	907	871
Total doctorates granted (fall counts)	952	889	858	904	860	792	792	769	801	845	856	958	991	1142

*1990–1991 employment status figures are fall counts; the entries for previous years are spring counts. 1990–1991 figures will be updated in the Second Report in a spring 1992 issue of *Notices*.

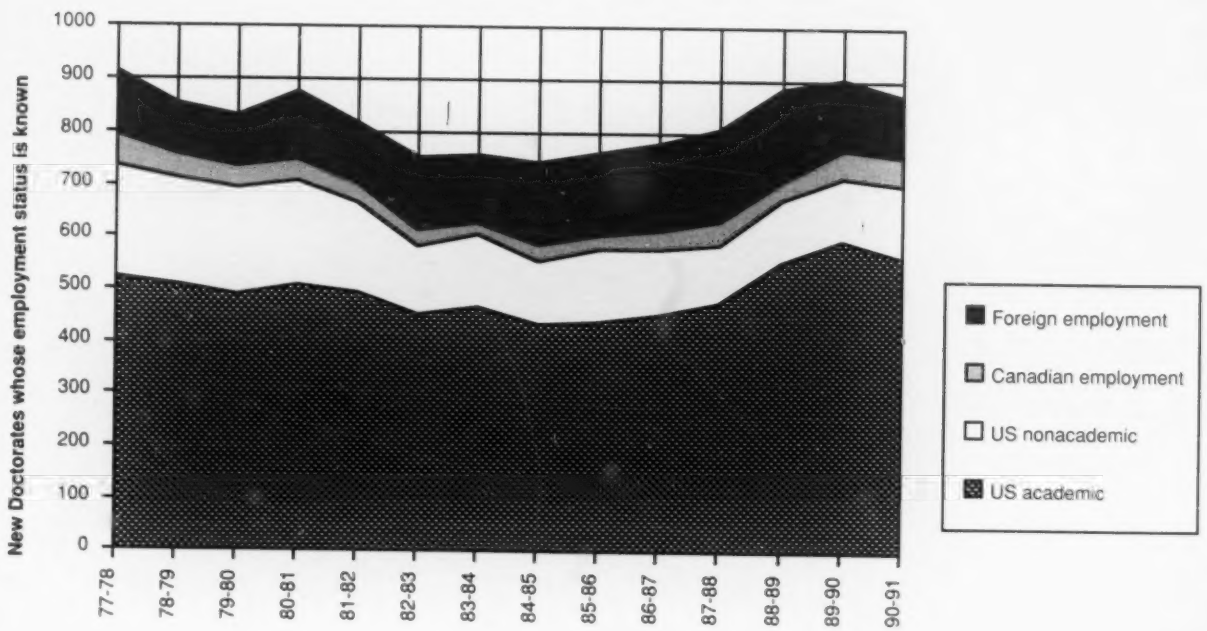


TABLE 4: Sex, Racial/Ethnic Group, and Citizenship of New Doctorates

July 1, 1990 — June 30, 1991

U.S. DEGREES	MEN					WOMEN					TOTAL
RACIAL/ETHNIC GROUP	CITIZENSHIP				Total Men	CITIZENSHIP				Total Women	
	U.S.	Canada	Other	Not Known		U.S.	Canada	Other	Not Known		
Asian, Pacific Islander	17	2	306	5	330	14		64	1	79	409
Black	7		5		12	3		1		4	16
American Indian, Eskimo, Aleut	1				1	1				1	2
Mexican American, Puerto Rican, or other Hispanic	2		28		30	4		7		11	41
None of those above	299	12	120	2	433	85	1	32	1	119	552
Unknown	23	1	20	4	48	5		1		6	54
Total	349	15	479	11	854	112	1	105	2	220	1074

CANADIAN DEGREES	MEN					WOMEN					TOTAL
RACIAL/ETHNIC GROUP	CITIZENSHIP				Total Men	CITIZENSHIP				Total Women	
	U.S.	Canada	Other	Not Known		U.S.	Canada	Other	Not Known		
Asian, Pacific Islander		4	18	2	24		1	3		4	28
Black			3		3						3
American Indian, Eskimo, Aleut											
Mexican American, Puerto Rican, or other Hispanic											
None of those above	1	24	7	1	33		3			3	36
Unknown				1	1						1
Total	1	28	28	4	61		4	3		7	68

Sex, Minority Group, and Citizenship of New Doctorates, 1990–1991

Table 4 presents a breakdown according to sex, racial/ethnic group, and citizenship of the new doctorates. The information reported in this table was obtained from departments granting the degrees and in some cases from the recipients themselves.

Of the 1074 doctorates awarded by U.S. universities, the citizenship is reported as known for 1061 recipients, with 461 reporting U.S. citizenship. The number of U.S. citizen new doctorates is 15 percent greater than in 1989–90 and is the highest count since 1981–82. Still, the number of U.S. citizens is substantially lower than it was throughout the 1970s. See Table 5 and the accompanying graphs.

At the same time that the number of U.S. citizens has increased, so has the number of noncitizen new doctorates. A total of 600 noncitizens were granted doctorates by U.S. universities in 1990–91. This represents an increase of 14 percent from the number in 1989–90. The number of noncitizen new doctorates has risen every year since 1978–79. The 1990–91 count is 121 percent greater than the number awarded by U.S. institutions ten years ago (272 in 1980–81).

The percentage increases in the numbers of U.S. citizen and noncitizen new doctorates parallel each other. As a consequence, the percentage that U.S. citizens represent of the total doctorates given by U.S. universities remains at the all-time low of 43 percent attained in 1989–90. Data for the period 1973–74 through 1990–91 are shown in Table 5.

Among the U.S. citizens receiving doctorates in the mathematical sciences, 10 were black (7 men, 3 women) and 6 were Mexican American, Puerto Rican or other Hispanic (2 men, 4 women).

Women account for 24 percent of the U.S. citizens receiving doctorates in the mathematical sciences from U.S. universities. This is equal to the highest percentage ever reported. In absolute numbers, the count of 112 U.S. citizen women earning doctorates is the highest number since the data on sex were first reported in 1973–74. See Table 6.

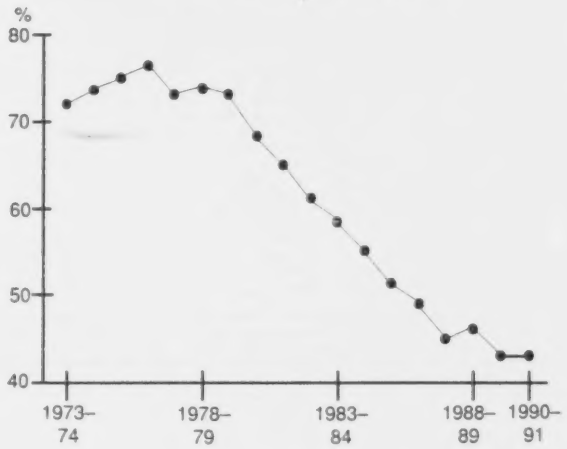
Note that in Table 5 and Table 6 all years prior to 1982–83 include doctorates granted by computer science departments.

TABLE 5: U.S. Citizen Doctorates

	Adjusted Total* of Doctorates given by U.S. universities	Total of Doctorates who are U.S. citizens	%
1973–1974	938	677	72
1974–1975	999	741	74
1975–1976	965	722	75
1976–1977	901	689	76
1977–1978	868	634	73
1978–1979	806	596	74
1979–1980	791	578	73
1980–1981	839	567	68
1981–1982	798	519	65
1982–1983	744	455	61
1983–1984	738	433	59
1984–1985	726	396	55
1985–1986	755	386	51
1986–1987	739	362	49
1987–1988	798	363	45
1988–1989	884	411	46
1989–1990	929	401	43
1990–1991	1061	461	43

*Number of doctorates whose citizenship is known. Total will vary from that on Table 3D because the data are gathered on different surveys.

Graph for Table 5: U.S. Citizen Doctorates
Total of Doctorates by Percent



Graph for Table 5: U.S. Citizen Doctorates

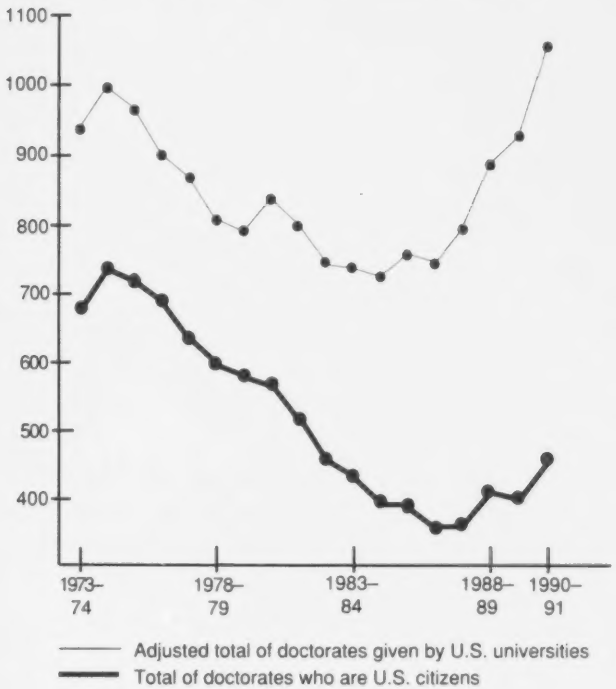


TABLE 6: U.S. Citizen Doctorates, Male and Female

	Doctorates who are U.S. citizens	Male	Female	% Female
1973–1974	677	618	59	9
1974–1975	741	658	83	11
1975–1976	722	636	86	12
1976–1977	689	602	87	13
1977–1978	634	545	89	14
1978–1979	596	503	93	16
1979–1980	578	491	87	15
1980–1981	567	465	102	18
1981–1982	519	431	88	17
1982–1983	455	366	89	20
1983–1984	433	346	87	20
1984–1985	396	315	81	20
1985–1986	386	304	82	21
1986–1987	362	289	73	20
1987–1988	363	287	76	21
1988–1989	411	313	98	24
1989–1990	401	312	89	22
1990–1991	461	349	112	24

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Salary Survey for New Recipients of Doctorates, 1990–1991

The figures for 1991 were compiled from questionnaires sent to individuals who received a doctorate in the mathematical sciences during the 1990–91 academic year from universities in the United States and Canada.

Questionnaires requesting information on salaries and professional experience were distributed to 1124 recipients of degrees using addresses provided by the departments granting the degrees. 523 individuals returned forms between late June and mid-September. Responses with insufficient data, or from individuals who indicated they had part-time employment, were not yet employed, or were not seeking employment, were considered unusable. Numbers of usable responses for each salary category are reported on the following tables.

Readers should be warned that the data in this report are obtained from a self-selected sample and inferences from them may not be representative of the population. For more comprehensive information on the recipients of new doctorates granted last year in the mathematical sciences in the U.S. and Canada, see the preceding article by D. McClure.

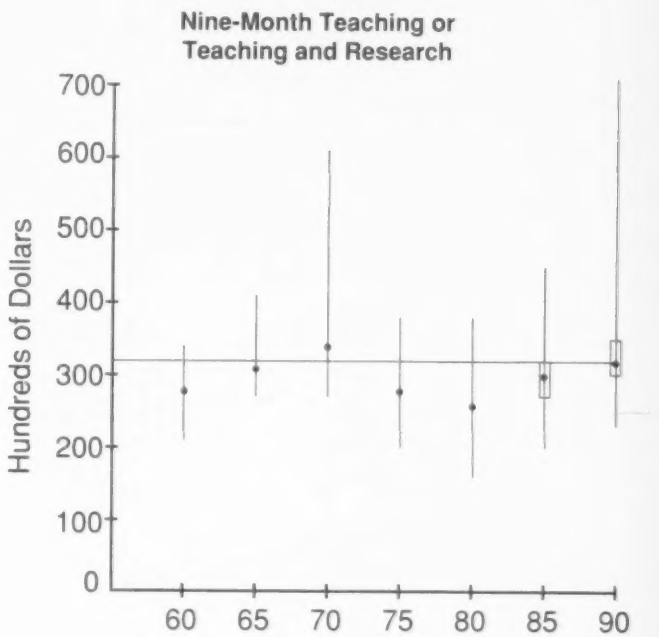
Key to Tables. *Salaries* are listed in hundreds of dollars. Nine-month salaries are based on 9–10 months teaching and/or research, not adding extra stipends for summer grants or summer teaching or the equivalent. *Years* listed refer to the academic year in which the doctorate was received. *M* and *F* are Male and Female respectively. *One year or less experience* means that the persons had experience limited to one year or less in the same position or a position similar to the one reported; some persons receiving a doctorate had been employed in their present position for several years. Quartile figures are given only in cases where the number of responses is large enough to make them meaningful.

Graphs. The horizontal line represents the median salary for 1990 in hundreds of dollars. The points plotted are the median salaries for each year converted to 1990 dollars using the implicit price deflator prepared annually by the Bureau of Economic Analysis, U.S. Department of Commerce. (Because the deflator is not yet available for this year, the 1991 figures do not appear on the graphs.) The boxes show the middle half of the population, where the quartile data are available.

Note that salaries for teaching, or teaching and research, have yet to return to their high point of 1970, although steady progress has been made since 1980. (For further details, see Donald Rung's article, "A Fifteen Year Retrospective on Academic Salaries of U.S. Doctorate Holding Faculty," in the November 1985 issue of *Notices*, pages 772–773.)

Nine-Month Salaries

Ph.D. Year	Min	Q_1	Median	Q_3	Max	Reported Median in 1990 $
TEACHING OR TEACHING AND RESEARCH (188 men + 54 women)						
1960	49		65		80	276
1965	70		80		105	311
1970	85		110		195	344
1975	90	120	128	135	173	284
1980	105	155	171	185	250	262
1985	170	230	250	270	380	296
1988	200	275	293	314	575	318
1989	200	290	310	330	478	323
1990	230	305	320	350	710	320
1991	150	310	330	360	610	
1988M	200	274	290	315	520	
1988F	216	275	299	314	575	
1989M	200	290	305	330	478	
1989F	220	295	310	330	470	
1990M	230	306	320	350	710	
1990F	250	300	325	360	493	
1991M	150	310	330	360	610	
1991F	260	310	332	360	550	
One year or less experience (129 men + 43 women)						
1991M	150	315	333	360	578	
1991F	260	314	325	349	475	



Nine-Month Salaries

Ph.D. Year	Min	Median	Max	Reported Median in 1990 $
RESEARCH (7 men + 1 woman)				
1960	52	65	80	277
1965	71	81	90	315
1970	78	105	160	329
1975	100	—	110	—
1980	125	137	180	210
1985	205	235	250	279
1986	260	280	385	304
1989	235	270	330	281
1990	230	300	404	300
1991	260	295	470	—
1988M	260	280	385	
1988F	—	—	—	
1989M	235	270	330	
1989F	—	—	—	
1990M	230	300	404	
1990F	—	—	—	
1991M	260	290	360	
1991F	—	—	—	
One year or less experience (6 men + 1 woman)				
1991M	260	280	300	
1991F	—	—	—	

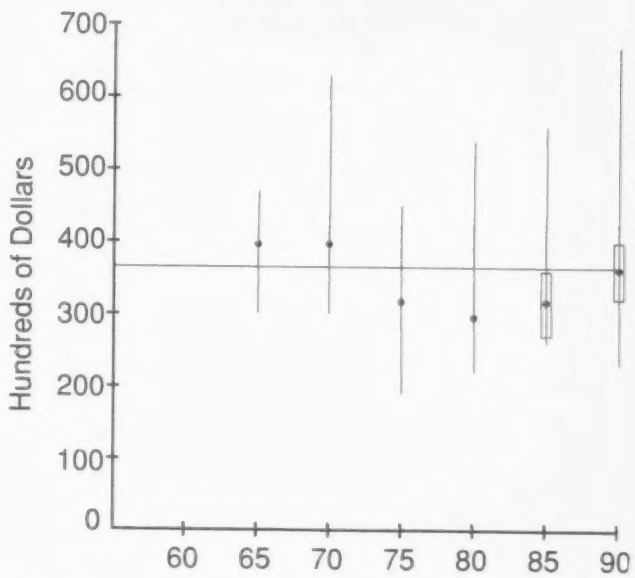
Nine-Month Research

Graph omitted because sample size too small.

Twelve-Month Salaries

Ph.D. Year	Min	Q_1	Median	Q_3	Max	Reported Median in 1990 $
TEACHING OR TEACHING AND RESEARCH (20 men + 5 women)						
1960	.....	No data	.....			
1965	78		104		121	405
1970	95		128		200	401
1975	87		145		204	322
1980	143		195		350	299
1985	220	230	273	300	470	324
1988	220	313	330	360	480	358
1989	238	290	315	370	620	328
1990	225	318	365	404	670	365
1991	290	310	350	408	758	—
1988M	220	308	330	355	480	
1988F	329	335	350	365	441	
1989M	238	295	315	370	620	
1989F	275	290	314	380	434	
1990M	225	316	360	400	670	
1990F	250	320	383	420	425	
1991M	290	310	350	400	530	
1991F	300	310	472	530	758	
One year or less experience (18 men + 2 women)						
1991M	290	320	350	400	505	
1991F	—	—	—	—	—	

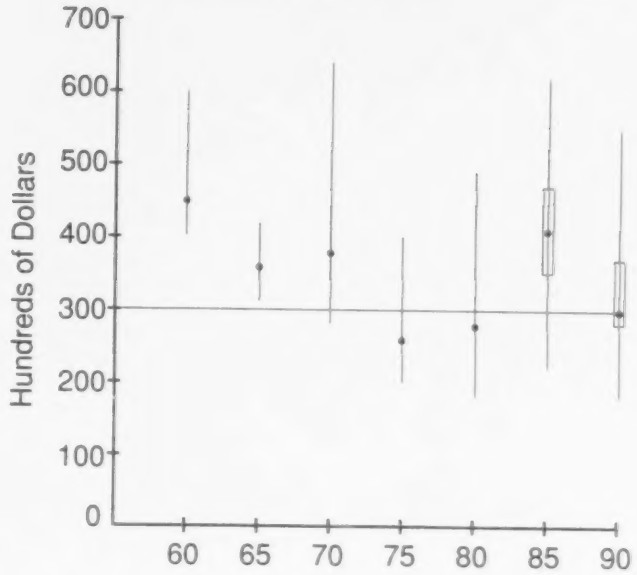
Twelve-Month Teaching or Teaching and Research



Twelve-Month Salaries

Ph.D. Year	Min	Q_1	Median	Q_3	Max	Reported Median in 1990 $
			RESEARCH (25 men + 11 women)			
1960	97		105		140	447
1965	81		93		107	362
1970	90		120		205	376
1975	90		119		180	264
1980	120		180		321	276
1985	190	295	342	400	520	406
1988	200	245	295	331	505	320
1989	180	250	317	385	623	330
1990	180	280	300	365	546	300
1991	190	277	320	380	480	—
1988M	200	240	280	330	505	
1988F	280	320	330	350	360	
1989M	180	250	300	393	623	
1989F	200	295	350	373	400	
1990M	180	280	300	360	546	
1990F	330	330	365	400	400	
1991M	190	290	310	360	480	
1991F	240	272	340	405	450	
One year or less experience (22 men + 6 women)						
1991M	250	300	310	360	480	
1991F	264	270	307	380	400	

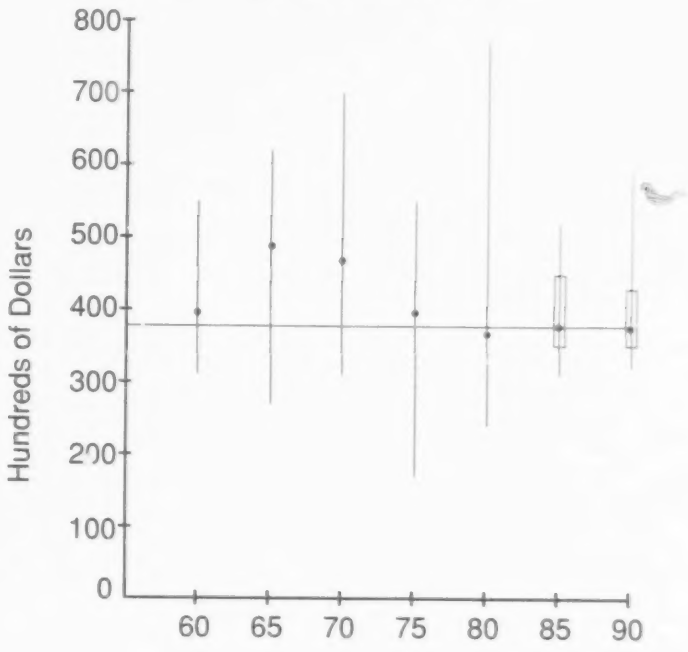
Twelve-Month Research



Twelve-Month Salaries

Ph.D. Year	Min	Q_1	Median	Q_3	Max	Reported Median in 1990 $
			GOVERNMENT (16 men + 4 women)			
1960	72		93		130	396
1965	70		126		160	490
1970	100		150		223	470
1975	78		182		247	404
1980	156		244		501	374
1985	263	294	325	381	440	385
1988	240	298	343	405	436	372
1989	330	363	378	438	540	394
1990	320	345	378	430	587	378
1991	230	365	423	497	630	—
1988M	240	290	332	360	436	
1988F	380	380	405	430	430	
1989M	330	363	378	438	540	
1989F	—	—	—	—	—	
1990M	320	345	375	430	587	
1990F	330	354	378	429	480	
1991M	230	345	424	497	630	
1991F	—	—	—	—	—	
One year or less experience (13 men + 2 women)						
1991M	230	330	373	450	630	
1991F	—	—	—	—	—	

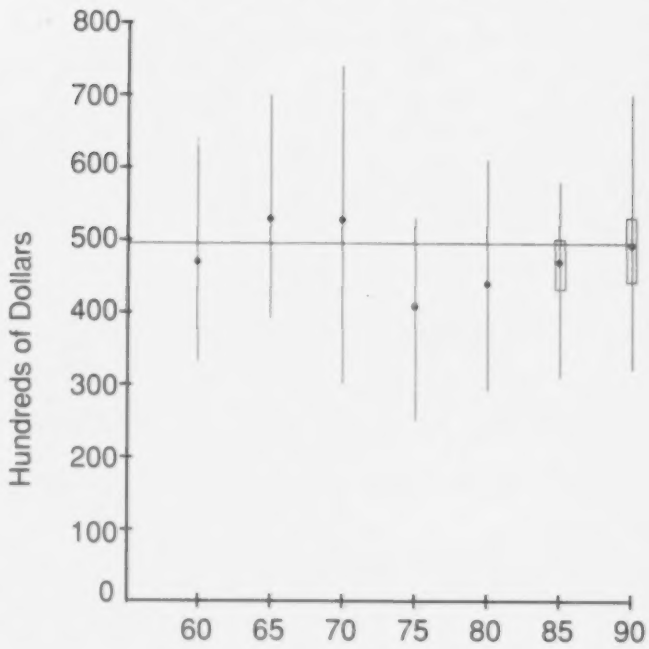
Twelve-Month Government



Twelve-Month Salaries

Ph.D. Year	Min	Q_1	Median	Q_3	Max	Reported Median in 1990 $
BUSINESS AND INDUSTRY (43 men + 10 women)						
1960	78		110		150	468
1965	100		136		180	529
1970	96		170		235	532
1975	114		187		240	415
1980	190		284		400	436
1985	260	360	400	420	493	474
1988	300	400	440	490	1100	477
1989	250	420	464	505	5250	483
1990	320	438	495	533	700	495
1991	235	480	510	573	830	
1988M	300	400	431	490	1100	
1988F	375	437	454	495	660	
1989M	250	420	464	513	5250	
1989F	375	430	470	500	516	
1990M	320	443	490	533	630	
1990F	390	440	500	525	700	
1991M	330	500	520	587	830	
1991F	235	420	481	554	720	
One year or less experience (24 men + 6 women)						
1991M	380	495	505	550	715	
1991F	235	420	471	510	570	

Twelve-Month Business and Industry



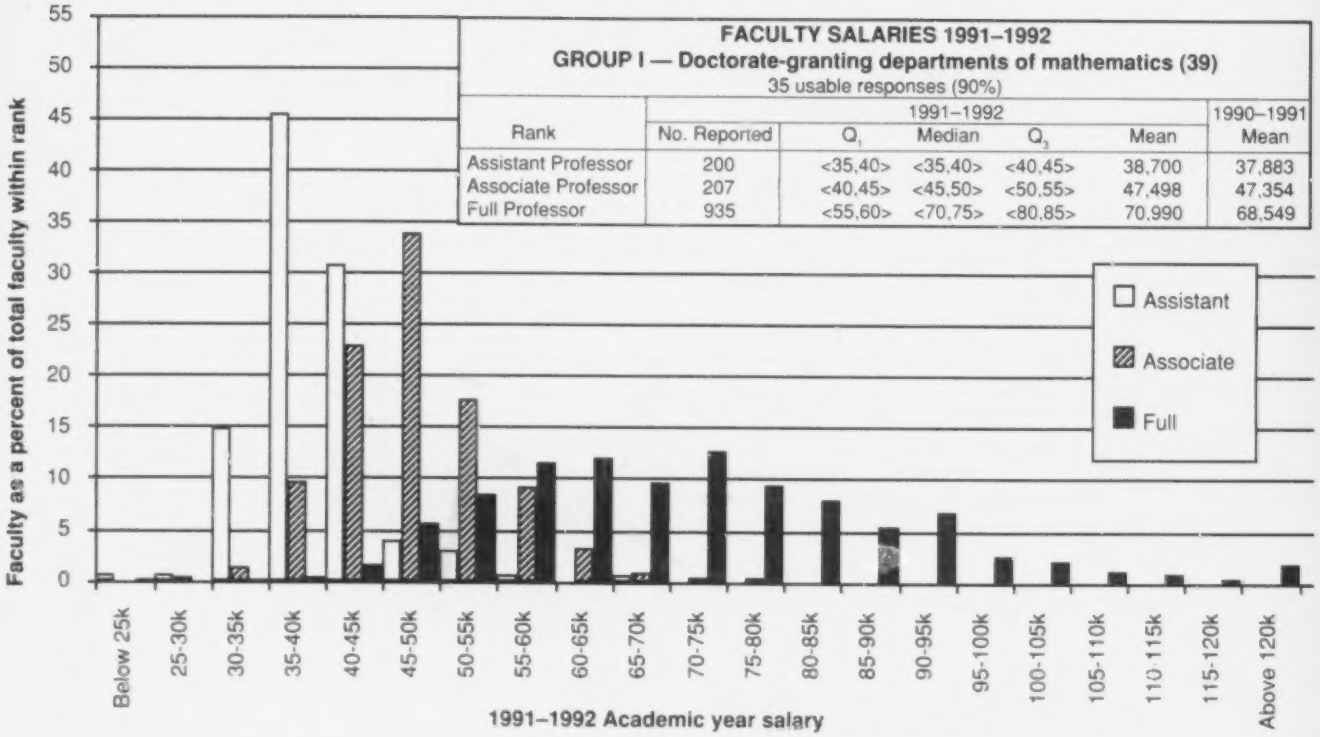
Faculty Salary Survey
1991–1992 Salaries

The charts on the following pages display faculty salary data for Groups I–VI, M and B: faculty salary distribution by rank, mean salaries by rank, information on quartiles by rank, and the number of usable returns for the group.

Departments were asked to report the number of faculty whose 1991–92 academic-year salaries fell within given salary intervals. Reporting salary data in this fashion eliminates some of the concerns about confidentiality, but does not permit determination of actual quartiles. What can be determined is the salary interval in which the quartiles occur, and this information has been added to this year's report. The salary intervals containing the quartiles are denoted by <n,n>.

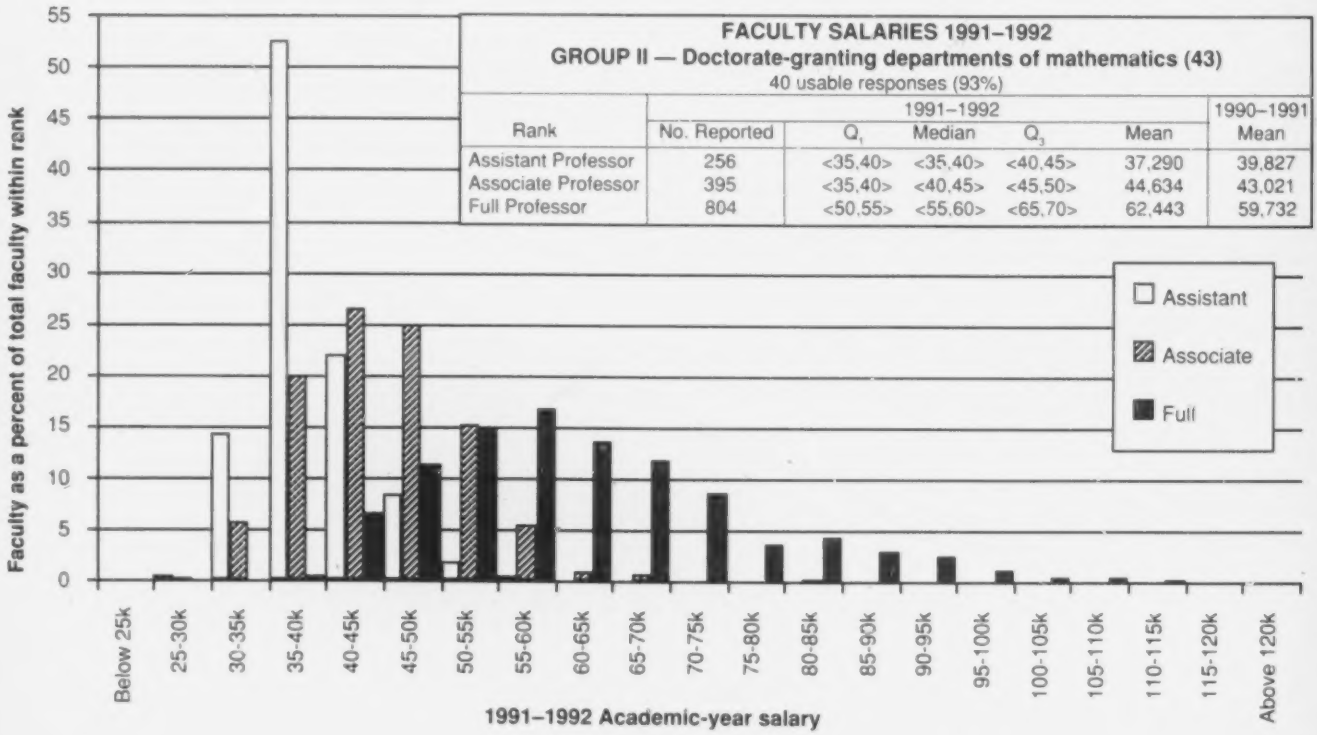
FACULTY SALARIES 1991–1992
GROUP I — Doctorate-granting departments of mathematics (39)
35 usable responses (90%)

Rank	1991–1992 No. Reported	Q_1	Median	Q_3	Mean	1990–1991 Mean
Assistant Professor	200	<35,40>	<35,40>	<40,45>	38,700	37,883
Associate Professor	207	<40,45>	<45,50>	<50,55>	47,498	47,354
Full Professor	935	<55,60>	<70,75>	<80,85>	70,990	68,549



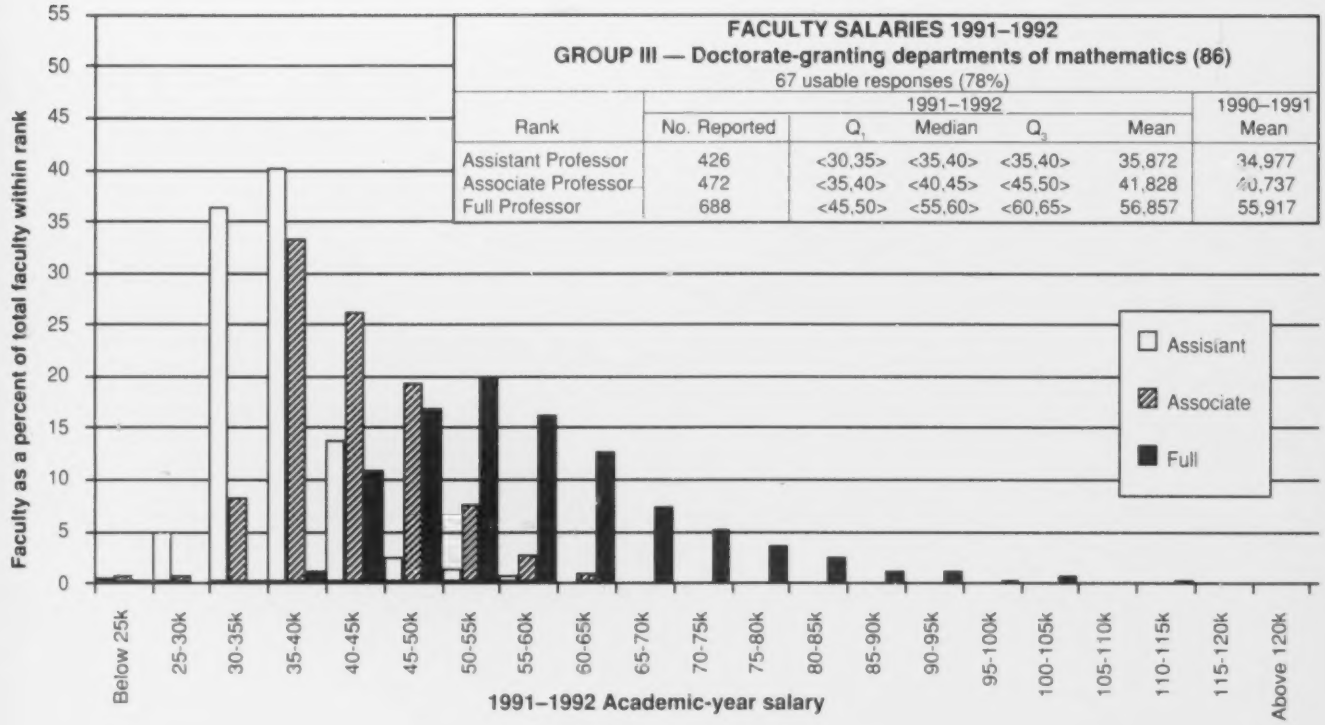
FACULTY SALARIES 1991–1992
GROUP II — Doctorate-granting departments of mathematics (43)
40 usable responses (93%)

Rank	1991–1992 No. Reported	Q_1	Median	Q_3	Mean	1990–1991 Mean
Assistant Professor	256	<35,40>	<35,40>	<40,45>	37,290	39,827
Associate Professor	395	<35,40>	<40,45>	<45,50>	44,634	43,021
Full Professor	804	<50,55>	<55,60>	<65,70>	62,443	59,732



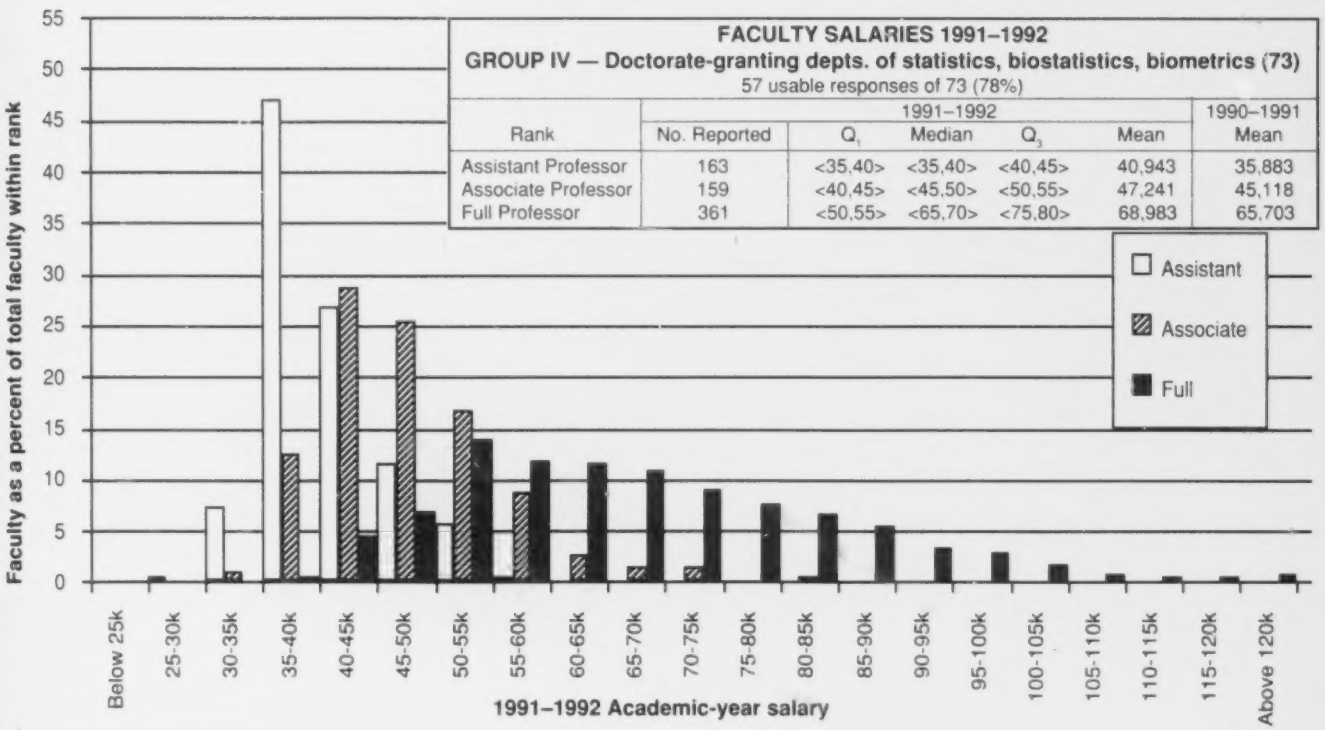
FACULTY SALARIES 1991–1992
GROUP III — Doctorate-granting departments of mathematics (86)
67 usable responses (78%)

Rank	1991–1992 No. Reported	Q_1	Median	Q_3	Mean	1990–1991 Mean
Assistant Professor	426	<30,35>	<35,40>	<35,40>	35,872	34,977
Associate Professor	472	<35,40>	<40,45>	<45,50>	41,828	40,737
Full Professor	688	<45,50>	<55,60>	<60,65>	56,857	55,917



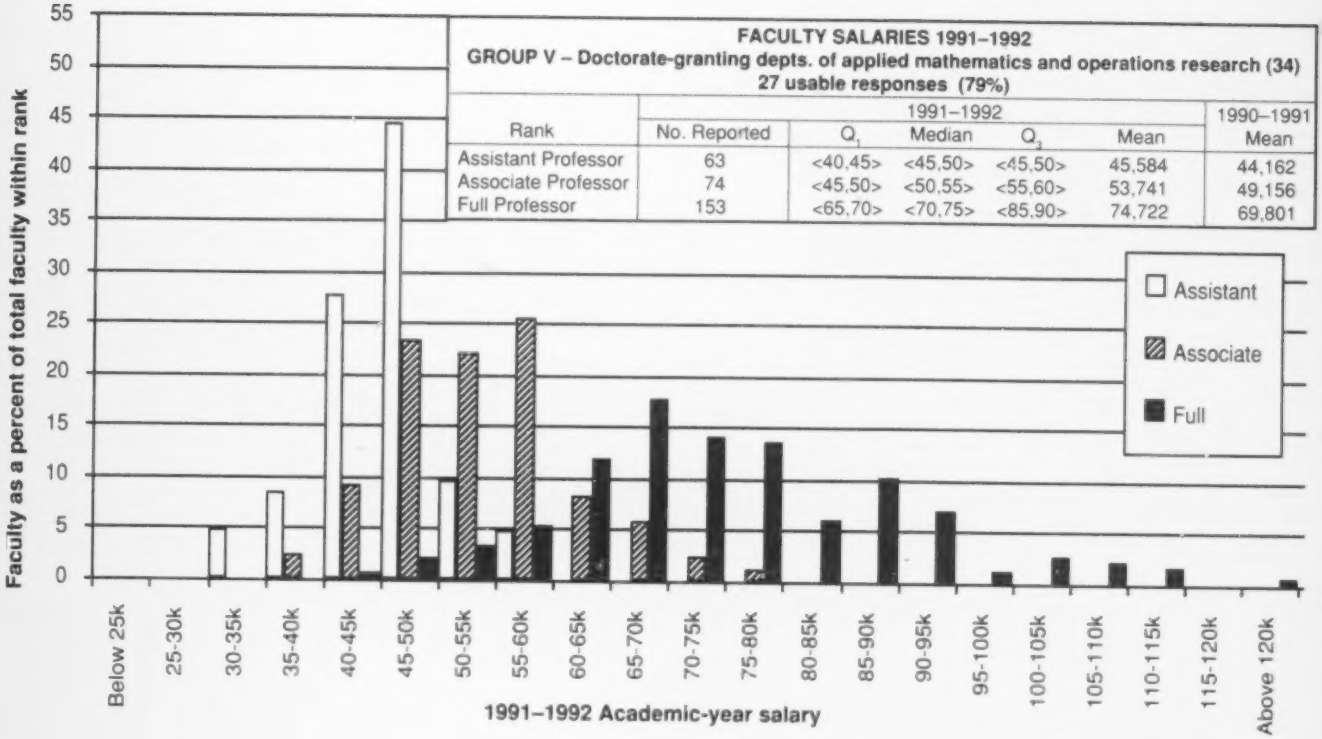
FACULTY SALARIES 1991–1992
GROUP IV — Doctorate-granting depts. of statistics, biostatistics, biometrics (73)
57 usable responses of 73 (78%)

Rank	1991–1992 No. Reported	Q_1	Median	Q_3	Mean	1990–1991 Mean
Assistant Professor	163	<35,40>	<35,40>	<40,45>	40,943	35,883
Associate Professor	159	<40,45>	<45,50>	<50,55>	47,241	45,118
Full Professor	361	<50,55>	<65,70>	<75,80>	68,983	65,703



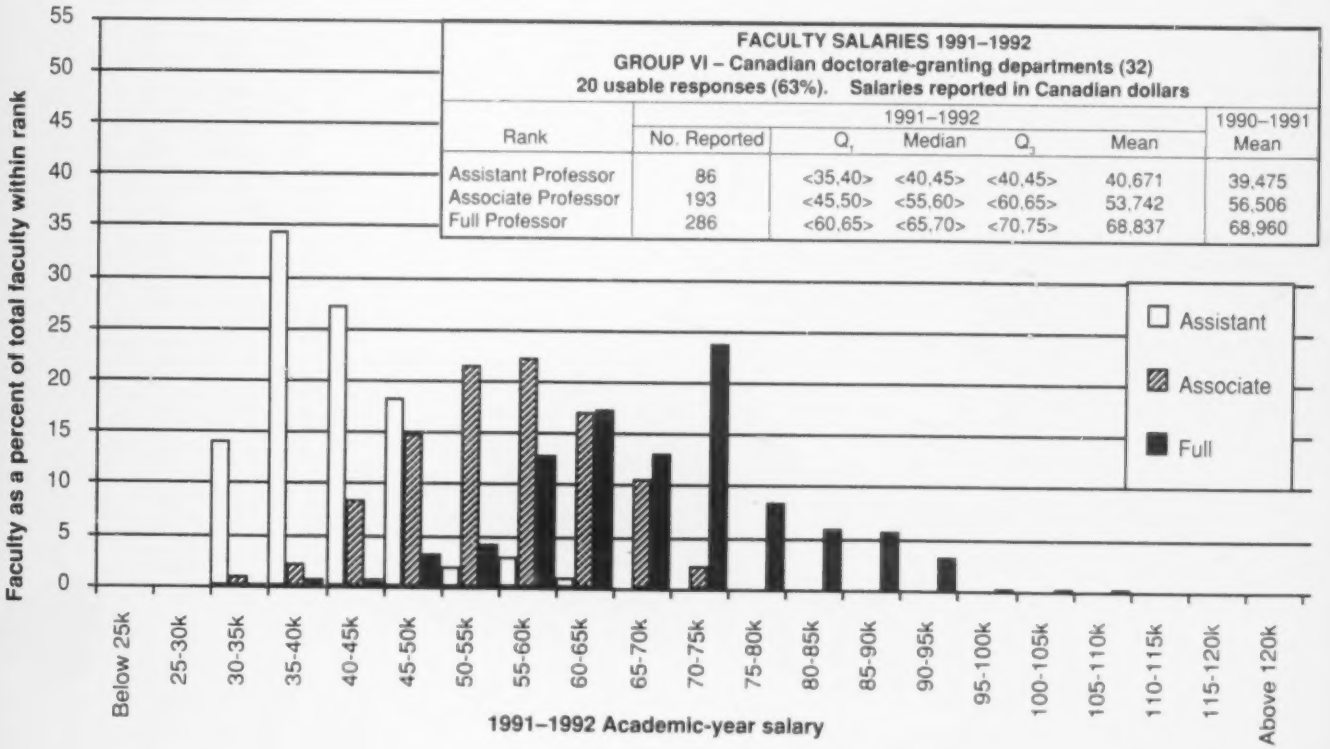
FACULTY SALARIES 1991–1992
GROUP V – Doctorate-granting depts. of applied mathematics and operations research (34)
27 usable responses (79%)

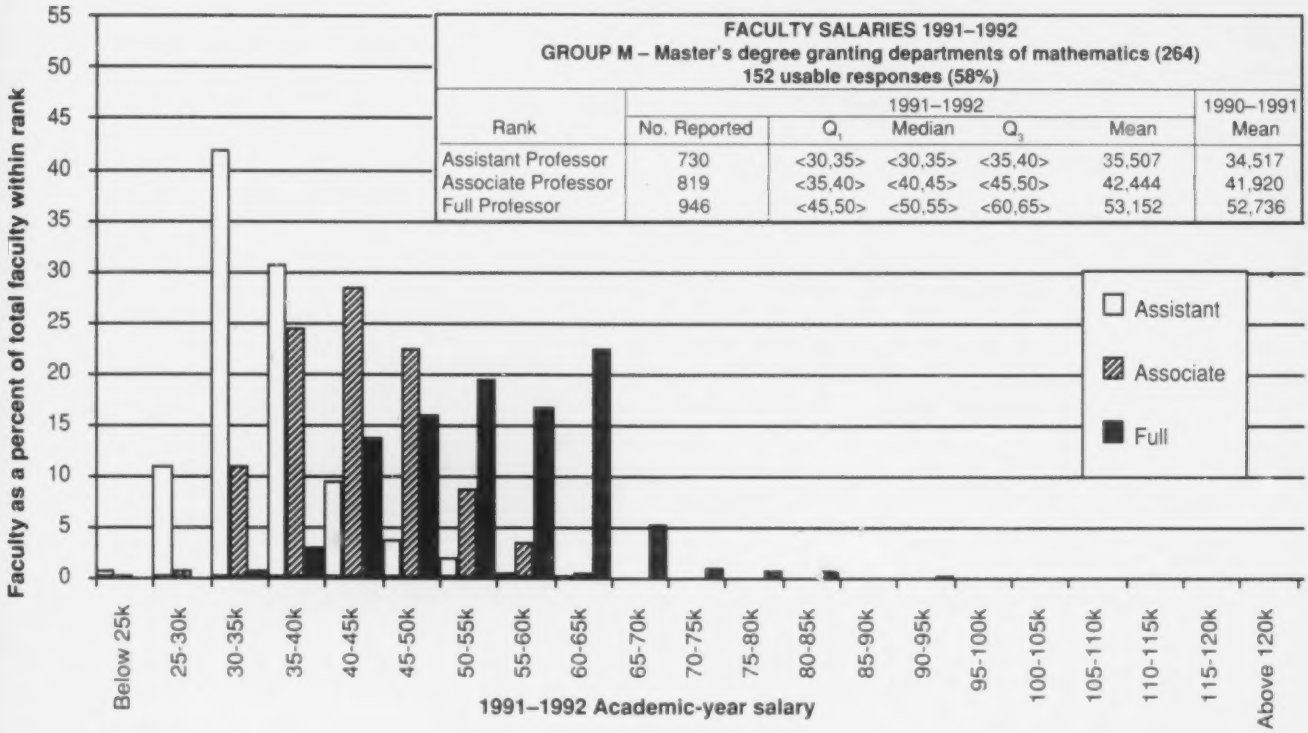
Rank	1991–1992 No. Reported	Q_1	Median	Q_3	Mean	1990–1991 Mean
Assistant Professor	63	<40,45>	<45,50>	<45,50>	45,584	44,162
Associate Professor	74	<45,50>	<50,55>	<55,60>	53,741	49,156
Full Professor	153	<65,70>	<70,75>	<85,90>	74,722	69,801



FACULTY SALARIES 1991–1992
GROUP VI – Canadian doctorate-granting departments (32)
20 usable responses (63%). Salaries reported in Canadian dollars

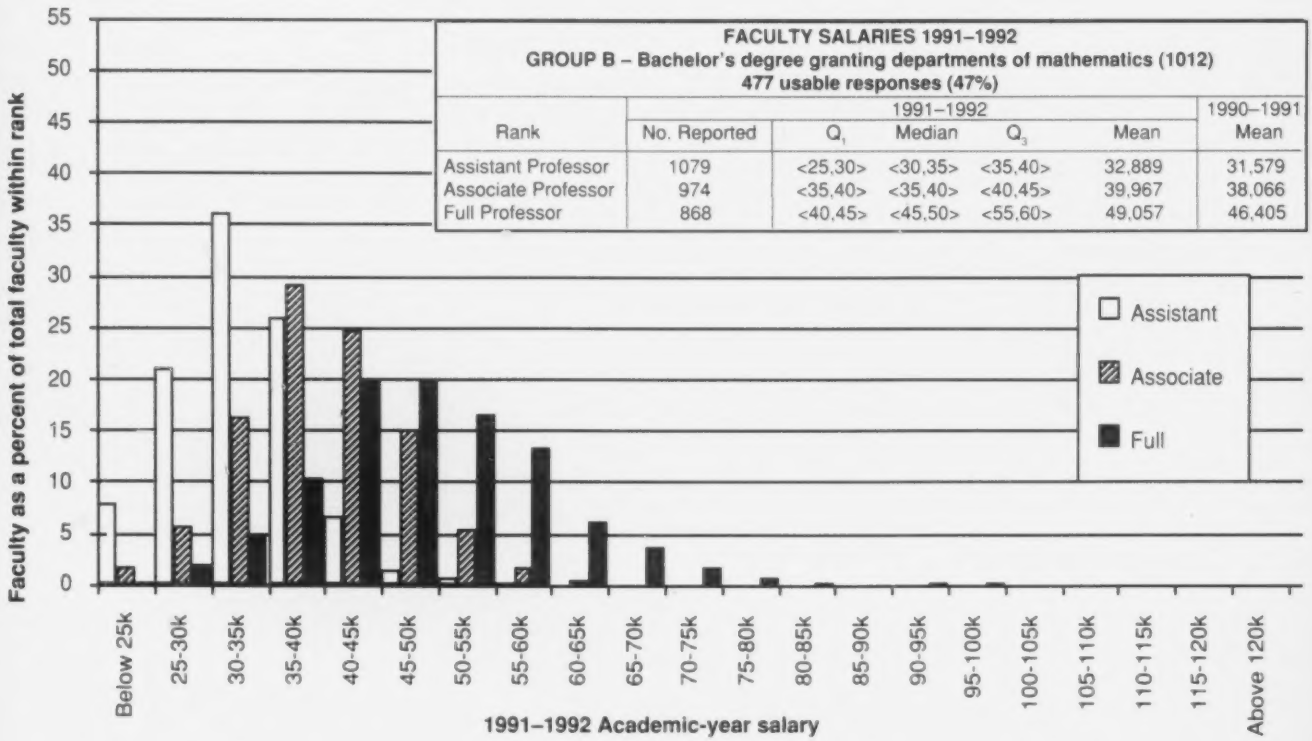
Rank	1991–1992 No. Reported	Q_1	Median	Q_3	Mean	1990–1991 Mean
Assistant Professor	86	<35,40>	<40,45>	<40,45>	40,671	39,475
Associate Professor	193	<45,50>	<55,60>	<60,65>	53,742	56,506
Full Professor	286	<60,65>	<65,70>	<70,75>	68,837	68,960





FACULTY SALARIES 1991–1992
GROUP M – Master's degree granting departments of mathematics (264)
152 usable responses (58%)

Rank	1991–1992 No. Reported	Q_1	Median	Q_3	Mean	1990–1991 Mean
Assistant Professor	730	<30,35>	<30,35>	<35,40>	35,507	34,517
Associate Professor	819	<35,40>	<40,45>	<45,50>	42,444	41,920
Full Professor	946	<45,50>	<50,55>	<60,65>	53,152	52,736



FACULTY SALARIES 1991–1992
GROUP B – Bachelor's degree granting departments of mathematics (1012)
477 usable responses (47%)

Rank	1991–1992 No. Reported	Q_1	Median	Q_3	Mean	1990–1991 Mean
Assistant Professor	1079	<25,30>	<30,35>	<35,40>	32,889	31,579
Associate Professor	974	<35,40>	<35,40>	<40,45>	39,967	38,066
Full Professor	868	<40,45>	<45,50>	<55,60>	49,057	46,405

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NOTICES
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1991 Annual AMS-MAA Survey

(Second Report)

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Enrollments, Faculty Characteristics, and Update on New Doctorates, Fall 1991

Donald E. McClure

This is the second report of the 1991 Survey. A first report appeared in the November 1991 *Notices*, pages 1086–1122. It included a report on the 1990–1991 new doctorates, starting salaries, faculty salaries, and a list of names and thesis titles of the 1990–1991 doctorates. A supplementary list of 1990–1991 doctorates appears in the May/June 1992 issue of the *Notices*.

The 1991 Annual AMS-MAA Survey represents the thirty-fifth in an annual series begun in 1957 by the Society. The 1991 Survey was under the direction of the AMS-MAA Data Committee whose members are: Edward A. Connors, Lincoln K. Durst (consultant), John D. Fulton, James F. Hurley, Charlotte Lin, Don O. Loftsgaarden, David J. Lutzer, James W. Maxwell (ex officio), Donald E. McClure (chair), and Donald C. Rung. Comments or suggestions regarding the Annual Survey may be directed to members of the AMS-MAA Data Committee.

For these reports, departments are divided into groups according to the highest degree offered in the mathematical sciences:

Groups I and II include the leading departments of mathematics in the U.S. according to the 1982 assessment of Research-Doctorate Programs conducted by the Conference Board of Associated Research Councils in which departments were rated according to the quality of their graduate faculty.[1]

Group I is composed of 39 departments with scores in the 3.0–5.0 range

Group II is composed of 43 departments with scores in the 2.0–2.9 range.

Group III contains the remaining U.S. departments reporting a doctoral program.

Group IV contains U.S. departments (or programs) of statistics, biostatistics, and biometrics reporting a doctoral program.

Group V contains U.S. departments (or programs) in applied mathematics/applied science, operations research, and management science that report a doctoral program.

Group Va is applied mathematics/applied science; **Group Vb** is operations research and management science.

Group VI contains doctorate-granting departments (or programs) in the mathematical sciences in Canadian universities.

Group M contains U.S. departments granting a master's degree as the highest graduate degree.

Group B contains U.S. departments granting a baccalaureate degree only.

[1]These findings were published in *An Assessment of Research-Doctorate Programs in the United States: Mathematical and Physical Sciences*, edited by Lyle V. Jones, Gardner Lindzey, and Porter E. Coggeshall, National Academy Press, Washington, D.C., 1982. The information on mathematics, statistics and computer science was presented in digest form in the April 1983 issue of the *Notices*, pages 257–267, and an analysis of the above classifications was given in the June 1983 *Notices*, pages 392–393. For a listing of departments in Groups I and II see the April 1988 *Notices*, pages 532–533.

Highlights

- The final (spring) count of new doctorates shows a total of 1,125 doctorates in the mathematical sciences awarded by U.S. institutions in the period July 1, 1990 through June 30, 1991. This is the largest number since 1971–72 and is 18% higher than the 1989–90 final count.

- The final count shows 478 U.S. citizens among the 1,089 doctoral recipients whose citizenship status is known. This is the largest number of U.S. citizen new doctorates since 1981–82.

- A total of 611 non-U.S. citizens were awarded doctorates in 1990–91. This is the largest number ever reported and represents an increase of 105% over the number of non-citizen new doctorates ten years earlier.

- Recruitment of new faculty showed a sharp decrease in 1990–91 from the level of the previous year. The doctorate-granting mathematics departments in the U.S. attempted to fill 17% fewer full-time positions in 1990–91 than in 1989–90. The master's and bachelor's degree granting mathematics departments sought 34% and 18% fewer new faculty members, respectively, than the year before.

- Unemployment and underemployment among new doctorates reflected the reduced recruitment and increased numbers of new doctorates. Out of 1,070 new doctorates whose employment status is known, 5% were reported to be unemployed and still seeking employment at the time of the spring count. This is the highest level of unemployment at this time of the year since spring data were first reported in 1977. An additional 5% of the new doctorates took part-time employment.

- In the final count, there were 112 women (23%) among the 478 U.S. citizen new doctorates. Among non-U.S. citizens, women represent 17% of the new doctorates. These percentages are substantially lower than the ones for earlier stages of the mathematics education pipeline. Among all U.S. citizen graduate students in U.S. mathematical sciences departments, women constitute 36% of the total. At the undergraduate level, 43% of junior/senior mathematical sciences majors are women.

I. Introduction

The Annual AMS-MAA Survey collects information each year about departments, faculties, and students in the mathematical sciences in the United States and Canada. This article reports results from two parts of the 1991 Annual AMS-MAA Survey. First, we update information about new doctorates reported earlier in the November 1991 issue of the *Notices* (see pages 1086–1102). Second, we present results about characteristics of faculties and of instructional programs at the undergraduate and graduate levels.

In the interest of continuity in the analysis and presentation, and to make year-to-year comparisons possible, we report the same kinds of information that were included in last year's Second Report. At the same time, we have added new details to the analysis to highlight data of current interest to the mathematics community about recruitment and the employment market.

Further, in order to present a picture of the current status of academic mathematics, we have used the survey responses to make projections to various statistics of the entire population of mathematical sciences departments. In contrast, the reports of the last three Annual Surveys concentrated on reporting year-to-year changes in statistics instead of their absolute values at the time.

The projections of survey responses to the full population are done within strata defined by the survey Groups. For example (see Table 3A), to obtain the total number of Group I faculty who retired or died between fall 1990 and fall 1991 we multiplied the 37 deaths and retirements reported in the 35 Group I responses by the ratio 39/35 of Group size over number of responding departments. Admittedly, this is not the ideal method of estimating population totals since biases may be introduced because of (i) selection bias of the responding departments and (ii) inhomogeneity of departments within the separate Groups. However, the problems of a possible selection bias are mitigated by the generally high response rates to the Annual Survey. In Groups with a lower response rate (Groups M and B), there is greater potential for biased projections. In the future we intend to use population strata defined by institutional enrollment and control (public or private), as was done in the 1990 CBMS Survey of Undergraduate Programs.

The reader may wish to compare results of the Annual AMS-MAA Survey with summary results reported for the 1990 CBMS Survey elsewhere in this issue of the *Notices*.

II. Update on the 1990–1991 New Doctorates

Information about new doctorates awarded between July 1, 1990 and June 30, 1991 was collected from doctorate-granting departments in late spring 1991 and from a follow-up census of individual degree recipients. The First Report of the 1991 Annual Survey (November 1991 issue of *Notices*, pages 1086–1102) presents the survey results obtained about new doctorates up to the time of that report. Here we update the earlier figures on the basis of more complete returns.

Table 1: New Doctorates, Fall and Spring Counts

	1986–87		1987–88		1988–89		1989–90		1990–91	
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
U.S.	779	808	804	828	905	919	933	950	1074	1125
Canada	66	66	52	55	53	62	58	59	68	68
Total	845	874	856	883	958	981	991	1009	1142	1193

The spring count of new doctorates (Table 1) shows a total of 1125 doctorates in mathematical sciences awarded by U.S. institutions and 68 awarded by Canadian institutions. The final count for U.S. institutions is an 18% increase from the previous year and is the highest number reported since 1971–72.

Citizenship status is known for 1089 of the new doctorates awarded by U.S. institutions. The total of 478 U.S. citizens is 17% greater than last year's spring count, and is the highest number reported since 1981–82. The percentage of U.S. citizens (44%) remains near its all-time low of 43%, largely because the increase in non-U.S. citizen new doctorates is keeping pace with the increase of U.S. citizens.

The number of non-U.S. citizen new doctorates has risen steadily since 1978–79. The final spring count shows 611 non-U.S. citizens, an increase of 14% above last year's spring count. Over the last ten years the number of non-U.S. citizen new doctorates has increased 105%. Most of the increase has occurred during the last five years. From 1980–81 to 1985–86 the number of non-U.S. citizen new doctorates increased 25%, based on counts reported in the fall analysis. From 1985–86 to 1990–91, the number of non-U.S. citizens increased by 65%. The most substantial increases are due to the new doctorates who are citizens of eastern Asian countries. Over the ten-year period, this number has increased by 300%, the compound effect of a 61% increase from 1980–81 to 1985–86 and a 148% increase from 1985–86 to 1990–91.

Among the U.S. citizens, the final tally shows 112 women and 366 men. The percentage of women (23%) among the U.S. citizens is substantially higher than the percentage (17%) among non-U.S. citizens.

Employment data for new doctorates, broken down by the field of their thesis research, are updated in Tables 2A and 2B (see next page). The employment matrices report the status of the 1142 new doctorates included in the fall count; employment status is known for 1070. (The employment matrix includes new doctorates from Canadian departments.) Overall, the majority (60%) of new doctorates assumed academic positions in the U.S., the same as the percentage reported last year. The percentage assuming academic positions, regardless of country, is 76%. The proportions assuming academic vs. nonacademic positions vary greatly with the field of thesis. For example, in probability and statistics, which includes 170 doctoral recipients from statistics and biostatistics programs, a greater proportion assume nonacademic positions. The First Report shows

Table 2A: Employment Status of 1990–1991 New Doctorates in the Mathematical Sciences, updated March 1992

Type of Employer	Field of Thesis										TOTAL
	Algebra/ Number Theory	Real or Complex Analysis	Geometry/ Topology	Logic	Probability/ Statistics	Applied Math	Discr. Math/ Combina-torics	Numerical Analysis	Linear or Non-linear Optim.	Other	
Group I	24	21	35	6	5	16	1	2	1	4	115
Group II	5	9	9	1	5	11	2	4	1	2	49
Group III	10	9	16		9	10	4	1	1	3	63
Group IV					37	3					40
Group V					6	7	1	2	1	2	19
Masters	21	13	8		17	11	8	3	2	8	91
Bachelors	20	18	31	2	15	20	6	5	1	18	136
Two-year Colleges	5	4	1		3	7	1			3	24
Other Academic Departments	3	1	1	3	19	16	2	2	2	18	67
Research Institutes	5	3	5		9	3			1	7	33
Government		2	1		9	13	2	1		4	32
Business and Industry	8	5	6	2	55	17	8	6	13	16	136
Canada, Academic	11	4	10		8	13	6	1	1	9	63
Canada, Nonacademic							1	1			2
Foreign, Academic	15	22	11	4	29	14	1	2	5	12	115
Foreign, Nonacademic		2			5	1	1			3	12
Not seeking employment	4	2	2		4		1	2		4	19
Still seeking employment	5	7	8	1	13	9	4	2	1	4	54
Unknown (U.S.)	4	3	5		1	2		1	2	2	20
Unknown (non-U.S.)*	8	11	3	1	12	4	2	5	2	4	52
Total	148	136	152	20	261	177	51	40	34	123	1142

*Non-U.S. citizens who returned to their country of citizenship and whose status is reported as "unknown" or "still seeking employment".

Table 2B: Employment Status of 1990–1991 New Doctorates in the Mathematical Sciences Females Only, updated March 1992

Type of Employer	Field of Thesis										TOTAL
	Algebra/ Number Theory	Real or Complex Analysis	Geometry/ Topology	Logic	Probability/ Statistics	Applied Math	Discr. Math/ Combina-torics	Numerical Analysis	Linear or Non-linear Optim.	Other	
Group I	3	4	3	2		2				1	15
Group II		3	1		2	3	1	1	1		12
Group III	2		3		2	4					11
Group IV					9						9
Group V					3					1	4
Masters	7	1	2		4	3	2				19
Bachelors	8	5	15		3	4	1	2		3	41
Two-year Colleges	1					2					3
Other Academic Departments	1	1			6	3	1	1	1	7	21
Research Institutes					2					3	5
Government					2		1			2	5
Business and Industry		1			16	3		1	3	3	27
Canada, Academic					1		1		1	1	4
Canada, Nonacademic							1				1
Foreign, Academic	2	4		1	9	3		1		3	23
Foreign, Nonacademic											
Not seeking employment	1		1		1			1		1	5
Still seeking employment	1			1	5		2				9
Unknown (U.S.)		1	3		1						5
Unknown (non-U.S.)*	2	1			4	1					8
Total	28	21	28	4	70	28	10	7	6	25	227

*Non-U.S. citizens who returned to their country of citizenship and whose status is reported as "unknown" or "still seeking employment".

additional differential patterns of employment depending on the type of department awarding the degree and on the citizenship status of the new doctorate.

The updated matrix shows 54 new doctorates (5%) still seeking employment. This figure does not include non-U.S. citizens who are known to have returned to their country of origin and who may be still seeking employment outside the U.S. At the same time a year ago, 2% of the 1989–90 new doctorates were reported as still seeking employment. As is widely known, the level of unemployment is worse for the 1990–91 cohort of new doctorates than is customary. In fact, the unemployment reported in the spring analysis has never exceeded 3% since the number was first reported in 1977.

The survey responses also reveal other indicators of the difficult employment market that are hidden in Tables 2A and 2B. The proportion of individuals in academic positions that are not tenure-eligible is high. Based on 434 individual responses from holders of academic positions, 50% report that their position is not tenure-eligible. Almost half of the nontenure-eligible positions have contract durations of one or two years. Seventy-two new doctorates (11 from Canadian departments and 61 from U.S. departments) report that they are employed by the same institution that awarded their degree. Table 2A shows 286 new doctorates holding positions in a doctorate-granting department in the U.S. (Groups I–V). Out of these 286 individuals, 45 received their degree from the same institution. Fifty-two of the jobs tallied in Table 2A are part-time positions.

Individual respondents also provided information about jobs for which they applied. Among 436 new doctorates who reported applying for an academic position, the average number of applications made for academic positions was 57 and the average number of applications made for nonacademic positions was 5.6. Among 159 new doctorates who reported applying for a nonacademic position, the average number of applications made for academic positions was 46 and the average number of applications made for nonacademic positions was 13.5.

Finally, we note that the names of the 1990–91 new doctorates and their thesis titles were published in the *Notices* (November 1991 and a supplemental list in May/June 1992).

III. Faculty Characteristics

Information about faculty and instructional programs was obtained from the Departmental Profile Survey sent to mathematical sciences departments in fall 1991. The First Report contained information collected earlier about faculty salaries.

Table 3A shows attrition due to deaths and retirements of faculty in mathematical sciences. Numbers of retirements tend to fluctuate substantially from year to year. Presumably these rates are sensitive to the effects of early retirement plans, and the attrition rates for a Group as a whole can show the effects of perturbations introduced by only a few institutions. The overall

Table 3A. Faculty Attrition*

	GROUP								
	I	II	III	I+II+III	IV	V	M	B	VI
Number of full-time faculty who retired or died (Group total)	41	25	52	118	16	3	116	132	23
% of full-time faculty in Group	2.0%	1.4%	2.1%	1.9%	1.4%	0.6%	2.0%	1.6%	1.7%
Number of usable responses**	35 (90%)	41 (95%)	80 (91%)	156 (92%)	52 (70%)	22 (59%)	151 (58%)	451 (46%)	20 (65%)

* Number and percentage of full-time faculty who were in the department in fall 1990 but were reported to have retired or died by fall 1991.
** The number of usable returns varies for different sections of the Departmental Profile Survey. The response rates reported here apply to faculty size and recruitment data only. All counts are projected from the survey response to the respective Group as a whole.

Table 3B. Faculty Recruitment

	GROUP								
	I	II	III	I+II+III	IV	V	M	B	VI
Number of open positions (Group total)*	181	89	172	441	81	30	316	558	65
Doctoral hires, male	144	68	113	326	47	17	175	308	50
Doctoral hires, female	26	5	18	49	14	2	45	94	8
Nondoctoral hires, male	1	1	3	5	0	0	12	70	0
Nondoctoral hires, female	0	1	3	4	0	0	19	35	0
Number of unfilled positions	9	14	34	57	20	12	66	51	8

* Number of positions under recruitment in 1990–1991 to be filled for 1991–1992.
Subtotals of rounded table values may exhibit rounding errors.

Table 3C. Faculty Size, Fall 1991, and Percentage Change in Size, Fall 1990 to Fall 1991

	GROUP								
	I	II	III	I+II+III	IV	V	M	B	VI
Total number of full-time faculty (Group total)	2059	1825	2461	6345	1157	572	5813	8214	1367
% change in full-time faculty	−0.0%	0.1%	−2.0%	−0.8%	0.1%	1.5%	−1.4%	0.1%	0.1%
Number of doctoral full-time faculty	2030	1710	2268	6008	1123	563	4444	5550	1280
% change in doctoral full-time faculty	−0.3%	−0.4%	−1.5%	−0.8%	0.1%	1.8%	0.2%	1.7%	2.6%
Number of tenured doctoral full-time faculty	1521	1336	1650	4507	756	372	3241	3687	1015
% change in tenured doctoral full-time faculty	−1.9%	−0.0%	−1.4%	−0.1%	−1.1%	2.8%	2.1%	0.2%	−2.2%
Number of untenured, tenure-eligible doctoral full-time faculty	203	278	521	1002	276	126	1080	1646	167
% change in untenured, tenure-eligible doctoral full-time faculty	−0.4%	−1.1%	−2.2%	−1.3%	2.2%	−0.5%	−1.5%	2.7%	1.9%
Number of untenured, nontenure-eligible doctoral full-time faculty	306	95	97	499	91	66	123	218	98
% change in untenured, nontenure-eligible doctoral full-time faculty	10.9%	8.3%	−18.5%	3.2%	−7.2%	2.6%	−9.0%	−5.7%	57.5%
Number of part-time faculty	113	201	596	910	78	74	1813	3494	53
% change in part-time faculty	3.1%	−18.6%	3.6%	−2.6%	−8.3%	10.0%	−2.7%	3.1%	−15.0%

Table 3D. Women Faculty Size, Fall 1991, and Percentage Change in Size, Fall 1990 to Fall 1991

	GROUP								
	I	II	III	I+II+III	IV	V	M	B	VI
Total number of full-time women faculty (Group total)	134	191	306	630	167	44	1200	1982	105
% change in full-time women faculty	0.0%	2.3%	−5.1%	−1.9%	−0.9%	0.0%	−0.7%	3.7%	−4.2%
Number of doctoral full-time women faculty	126	125	197	448	155	42	595	936	88
% change in doctoral full-time women faculty	4.6%	0.8%	−4.8%	−0.7%	−1.8%	4.2%	0.3%	7.6%	−3.4%
Number of tenured doctoral full-time women faculty	64	70	90	224	53	15	361	503	50
% change in tenured doctoral full-time women faculty	−6.6%	−1.5%	−1.2%	−2.8%	2.8%	0.0%	5.6%	15.1%	3.2%
Number of untenured, tenure-eligible doctoral full-time women faculty	14	37	91	142	77	19	207	378	33
% change in untenured, tenure-eligible doctoral full-time women faculty	−18.8%	2.9%	−5.7%	−5.1%	−1.8%	0.0%	−2.4%	0.0%	−4.6%
Number of untenured, nontenure-eligible doctoral f-t women faculty	48	18	15	81	26	8	26	55	6
% change in untenured, nontenure-eligible doctoral f-t women faculty	38.7%	6.2%	−17.6%	15.6%	−10.0%	25.0%	−31.8%	0.0%	−33.3%
Number of part-time women faculty	37	70	212	319	24	7	729	1455	8
% change in part-time women faculty	−5.7%	−20.2%	3.8%	−3.9%	30.8%	33.3%	−1.9%	5.3%	−50.0%

attrition rate for Group I, for example, nearly doubled from the rate a year ago, and this mainly reflects a number of retirements that more than doubled in Group I. At the same time, the number of retirements from departments in Group B in 1990–91 is approximately half the number of the year before.

Table 3B reports information on the number of full-time faculty positions that departments attempted to fill during 1990–91. Here there is a striking difference from the previous year. In every Group the number of positions recruited is significantly lower than in 1989–90. Overall, Groups I through III (the doctorate-granting mathematics departments) sought 17% fewer new faculty in 1990–91 than in 1989–90. Group III was especially hard hit; in 1990–91 Group III departments recruited 26% fewer new faculty than the year before. Similar cuts affected the other Groups: Group IV recruited 33% fewer new faculty; Group M sought 34% fewer new faculty; and Group B recruitment was down by 18%. We believe that these data indicate the effect of economic conditions on the difficult employment market for doctoral mathematical scientists.

Table 3B also provides information about hiring patterns for doctoral faculty. Among doctoral new hires, 13% of the new hires in Groups I, II, and III combined are women and 22% of the new hires in Groups M and B combined are women. Both of these percentages are marginally lower than last year.

Tables 3C and 3D describe the makeup of faculties by sex, tenure status, and doctoral/nondoctoral degree in the different Groups. These data show that there have not been substantial changes since the previous year in total faculty size. The only significant variations from the 1990 Annual Survey occur among numbers of untenured, nontenure-eligible faculty. Traditionally, among mathematics departments, Groups I and II employ larger numbers of faculty in this category relative to their total doctoral faculty size, and Groups III, M, and B employ smaller numbers. From 1989–90 to 1990–91, there were very substantial increases in untenured, non tenure-eligible full-time faculty in Groups I and II and similarly substantial decreases within Groups III, M, and B. These changes may also reflect effects of the difficult employment market.

Tables 3C and 3D together show proportions of women faculty in different categories of tenure and employment status. For example, the proportion of women among full-time faculty in mathematics departments (Groups I, II, III, M, and B) is 19% (3812/20372) and the proportion among full-time faculty in statistics departments (Group IV) is 14% (167/1157). These percentages echo the results of the 1990 CBMS Survey summarized elsewhere in this issue of the *Notices*.

IV. Enrollment Profile and Undergraduate Majors

The Departmental Profile Survey collects information about enrollments and distribution of instructional effort in mathematical sciences departments.

Table 4A summarizes enrollment data for undergraduate and graduate courses. Undergraduate enrollments were generally stable and graduate enrollments increased modestly from 1989–90 to 1990–91.

Table 4A, together with Table 3C, provides illuminating statistics about the instructional load of mathematical sciences faculty. The CBMS Surveys have reported substantial increases in the number of enrollments per full-time faculty member over the past 20 years. Tables 4A and 3C show results consistent with the 1990 CBMS Survey and they show the variation of instructional load between Groups. The respective ratios by Group of enrollment per full-time faculty member (FTFM) are:

Table 4A. Undergraduate and Graduate Enrollments (thousands), Fall 1991, and Percentage Change in Enrollments, Fall 1990 to Fall 1991

	GROUP							
	I	II	III	IV	V	M	B	VI
Number of undergraduate course enrollments (thousands)	175	177	316	61	21	631	785	161
% change in undergraduate course enrollments	–0.8%	–0.5%	–1.4%	–0.5%	4.8%	0.5%	2.0%	11.0%
Number of graduate course enrollments (thousands)	10	8	12	22	9	20	2	2
% change in graduate course enrollments	0.7%	3.4%	5.7%	3.8%	4.1%	3.3%	–5.6%	78.0%
Number of usable responses	34 (84%)	41 (95%)	79 (90%)	51 (79%)	22 (59%)	149 (57%)	442 (45%)	20 (65%)

* The number of usable returns varies for different sections of the Departmental Profile Survey. The response rates reported here apply to Tables 4A through 4C on enrollments and class size only. All counts are projected from the survey response to the respective Group as a whole.

Group I, 89.8 enrollments per FTFM; Group II, 101.4 enrollments per FTFM; Group III, 129.2 enrollments per FTFM; Group IV, 71.7 enrollments per FTFM; Group V, 52.4 enrollments per FTFM; Group M, 112.0 enrollments per FTFM; Group B, 95.8 enrollments per FTFM; and Group VI, 119.2 enrollments per FTMF.

Table 4B provides a summary of the largest components of undergraduate mathematics instruction. There are no striking changes from the 1990 Annual Survey. Table 4C reports average class size by type of course and survey Group.

In every group except Group V (applied mathematics and operations research departments), the number of undergraduate majors increased (Table 4D).

Table 4B. Distribution of Undergraduate Enrollments, Fall 1991

COURSES	GROUP						
	I	II	III	I+II+III	M	B	VI
Remedial mathematics*, %	10.0	7.5	11.0	9.8	16.7	18.4	1.7
Remedial mathematics + precalculus, %	24.2	28.3	38.7	32.1	34.2	33.1	4.6
Remedial mathematics + precalculus + calculus, %	63.8	59.3	62.1	61.8	49.2	47.4	36.6

* Arithmetic, high school algebra, geometry.

Table 4C. Average Class Size, Fall 1991

COURSES	GROUP							
	I	II	III	IV	V	M	B	VI
Remedial mathematics*	36	31	39		23	32	28	46
Traditional precalculus	31	38	44			36	30	76
First-year calculus	35	42	40			32	25	81
Undergraduate statistics	33	39	37	45	55	33	26	44
Undergraduate computer science	36	21	23	26	57	22	19	22
Other undergraduate courses for majors	30	31	28			21	15	32
Other undergraduate courses (not for majors)	35	36	42			33	28	59
Graduate courses	10	10	9	17	18	10	10	4
All courses	30	32	34	31	31	29	24	40

* Arithmetic, high school algebra, geometry.

Table 4D. Undergraduate Junior/Senior Majors (hundreds) and Undergraduate Women Junior/Senior Majors (hundreds), Fall 1991, and Percentage Change in Majors, Fall 1990 to Fall 1991

	GROUP							
	I	II	III	IV	V	M	B	VI
Number of junior/senior majors (hundreds)	55	45	70	17	23	219	279	87
% change in junior/senior majors	0.5%	7.5%	6.4%	1.6%	–6.9%	3.1%	6.2%	2.0%
Number of women junior/senior majors (hundreds)	19	19	32	6	7	100	123	27
% change in women junior/senior majors	–5.6%	10.1%	11.2%	–5.6%	–7.7%	5.3%	7.2%	2.4%
Number of usable responses*	34 (87%)	40 (93%)	72 (82%)	50 (68%)	21 (57%)	125 (48%)	383 (39%)	14 (45%)

* The number of usable returns varies for different sections of the Departmental Profile Survey. The response rates reported here apply to undergraduate major data only. All counts are projected from the survey response to the respective Group as a whole.

V. Graduate Student Profile

Tables 5A through 5C summarize tallies of graduate students derived from the 1991 Departmental Profile Survey.

Numbers of first-year graduate students increased by 2.6% overall in the doctorate-granting U.S. mathematics departments. However, the increase was not experienced by all Groups. Group III showed a substantial increase (12.8%), while Group I showed a decrease in the number of first-year students (–6.8%). Last year the direction of these changes was reversed; commonly, Groups that experience a large increase in new students in one year will have a decrease in first-year students the following year. Group M follows this pattern also, with a 5.6% drop in new students in 1991 following a 4.3% increase the previous year.

Table 5B gives the numbers of women graduate students by Group. In the U.S. mathematics departments (Groups I, II, III, and M) 35.2% of the first-year students are women. Table 4D shows that among undergraduate majors in mathematics, 43.8% are women. It is interesting to note that the pipeline for women in statistics does not narrow in the same way that it does in mathematics. While 38.0% of the junior/senior majors in Group IV departments are women, 45.2% of the first-year graduate students in Group IV are women. Among U.S. citizens, women represent 47.7% of the first-year graduate students in Group IV in 1991.

Table 5C records the numbers of U.S. citizen graduate students by Group. In Groups I, II, III, and M, the proportion of U.S. citizens among first-year students is approximately the same as the proportions reported a year ago for the 1990 Annual Survey. However, in Group IV 57.6% of the first-year students in fall 1991 were U.S. citizens, compared to 51.2% in the previous year.

In all doctorate-granting departments, the percentage of U.S. citizens among graduate students is substantially higher than their percentage among new doctorates.

Table 5A. Full-time Graduate Students, Fall 1991, and Percentage Change in Graduate Students, Fall 1990 to Fall 1991

	GROUP						
	I	II	III	IV	V	M	VI
Total number of full-time graduate students	3751	2635	3440	3085	2134	3285	1353
% change in full-time graduate students	–1.0%	4.8%	2.8%	3.4%	14.8%	–1.3%	6.0%
Number of first-year graduate students	928	771	1172	961	657	1257	416
% change in first-year graduate students	–6.8%	1.7%	12.8%	–0.3%	9.7%	–5.6%	9.9%
Number of usable responses*	35 (90%)	41 (95%)	75 (85%)	51 (69%)	21 (57%)	130 (50%)	19 (61%)

* The number of usable returns varies for different sections of the Departmental Profile Survey. The response rates reported here apply to Tables 5A through 5C on graduate student enrollments. All counts are projected from the survey response to the respective Group as a whole.

Table 5B. Women Full-time Graduate Students, Fall 1991, and Percentage Change in Women Graduate Students, Fall 1990 to Fall 1991

	GROUP						
	I	II	III	IV	V	M	VI
Total number of full-time women graduate students	855	770	1143	1149	564	1399	276
% change in full-time women graduate students	–1.5%	6.2%	3.3%	3.7%	20.8%	–0.4%	9.0%
Number of first-year women graduate students	260	264	417	434	204	514	101
% change in first-year women graduate students	–2.9%	7.2%	9.9%	18.2%	13.7%	–7.6%	6.9%

Table 5C. U.S. Citizen Full-time Graduate Students, Fall 1991, and Percentage Change in U.S. Citizen Graduate Students, Fall 1990 to Fall 1991

	GROUP					
	I	II	III	IV	V	M
Total number of full-time U.S. citizen graduate students	1978	1489	2073	1531	1006	2267
% change in full-time U.S. citizen graduate students	1.0%	9.2%	4.1%	7.5%	12.8%	–3.2%
Number of first-year U.S. citizen graduate students	509	491	759	554	317	924
% change in first-year U.S. citizen graduate students	–9.3%	4.0%	14.7%	7.0%	–1.1%	–4.2%

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The Annual AMS-MAA Survey attempts to provide an accurate appraisal and analysis of various aspects of the academic mathematical scene for the use and benefit of the mathematics community. Every year, college and university departments in the United States and doctorate-granting departments in Canada are invited to respond. The Annual Survey relies heavily for the quality of its information on the conscientious efforts of the dedicated staff members of these departments. On behalf of the AMS-MAA Data Committee and the Annual Survey staff, I thank the many secretarial and administrative staff members in the mathematical sciences departments for their cooperation and assistance in responding to the survey questionnaires. Monica Foulkes has made essential contributions to the coordination of the Annual Survey, management of the work of the Data Committee, full computerization of the data analysis, and preparation of the reports. The Data Committee expresses special thanks to her.

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